SECTION 5: END SECTION

The end section serves a human readable indication of the end of a GRIB record. It can also be used for computer verification that a complete GRIB record is available for data extraction. It should not be used as a search target since a '7777' bit combination could exist anywhere in the binary data stream.

Octet no.		
1-4	'7777'	(Coded CCITT-ITA No. 5) (ASCII)

APPENDIX A

OUTLINE OF WMO BULLETIN HEADERS

USED WITH

G R I B

WMO BULLETIN HEADER

The WMO abbreviated heading is used to identify the NCEP GRIB messages; however, it is not a complete description of their content. The user is cautioned against using the header as the sole determiner of the record content; one should, of course, rely on the Product Definition Section for that purpose.

Note: In the following, a hexadecimal number is enclosed in parentheses followed by the designation "hex".

The information needed to identify the NCEP product is contained in 21 octets. The characters are encoded using the CCITT-ITA No. 5, also known (in the US) as ASCII characters, and are defined as follows:

Octet no. Header Content

1 The character 'H' for GRIB bulletins sent to the NWS Family of Services, used for the WAFS program, and for general International Exchange
or
The character 'O' for oceanographic GRIB bulletins intended for general International and National Exchange and for use in the NWS AWIPS program
or
The characters 'Y' or 'Z' for meteorological GRIB bulletins intended for the NWS AWIPS program.

2 A letter character specifying the type parameter as shown in Table A.1.

3 A letter character specifying the grid area as defined in Table A.2.

4 A letter or numeric character indicating the time difference between the reference time and valid time of the data as listed in Table A.3, i.e., the forecast length.

5-6 Numeric characters as defined in Table A.4. Usually the pressure level, sometimes just a sequence number. Some values have special level or layer meanings.

7 Blank (20)hex

8-11 Four characters identifying the originating center. The first three characters are always 'KWB' for NCEP-produced messages. The last character is a letter specifying the NCEP model as defined in Table A.5.

12 Blank (20)hex

13-14 Two numeric characters providing the reference day of the month (01-31) of the data.

15-18 Four numeric characters providing the reference hour and minute of the data.

2 Four OPTIONAL characters: one blank (20)hex, then 'Pxx', where xx=AA, AB, AC ... AY, AZ, BA, BB, BC ... etc. Used to indicate sequential parts of a very long message that has been subdivided. The **last** part of the message will have xx=Zn, where n is the next letter in the appropriate sequence. Example: a five part message would have the parts indicated by PAA, PAB, PAC, PAD, PZE.

1 or 23-25 Two ASCII carriage returns and a line feed, (0D0D0A)hex.
The first six characters are commonly referred to as

$$T_1\ T_2\ A_1\ A_2\ \ ii$$

In summary...

Generic Meaning of $T_1\ T_2\ A_1\ A_2$ ii:

T_1: Type of bulletin: "H" for GRIB messages for Family of Services, WAFS, and International Exchange;
"O" for Oceanographic GRIB messages for National and International Exchange and for AWIPS GRIB messages; or
"Y" or "Z" for AWIPS GRIB messages

T_2: Type of data/parameter

A_1: Grid

A_2: Analysis or forecast hour

ii: Numeric. Usually the pressure level, sometimes just a sequence number. Some values have special level or layer meanings.

In the following tables, the columns headed AWIPS are augmentations to the common Family of Services (FOS),National, and International Exchange variables. FOS, National and International GRIB messages (with H as the initial character) draw upon the left hand columns only. National, International, and AWIPS GRIB messages (with O as the initial character) draw upon the middle column only. AWIPS GRIB messages (with Y or Z as the initial character) use letters from both the left and right columns. If each column contains entries for the same designator, the T_1 character (H, O, Y, or Z) indicates which entry to use.

TABLE A.1 TYPE PARAMETERS - T_2
(Header Octet 2)

DESIGNATOR	PARAMETER		
	FOS & International (H)	AWIPS (O)	AWIPS (Y or Z)
A		U-wind component at 10 m above msl	Cloud or non-conforming ICWF* parameters
B		V-wind component at	Vertical Wind Shear
C		Total Significant Wave Height	Vorticity
D		Depth	Probability parameters
E	Total Precipitation	Ice Concentration	
F	Long Wave Radiation	Ice Thickness	Precipitable water
G	Convective Precipitation	Ice Drift	
H	Height (geopotential)	Ice Growth	
I		Ice Convergence/Divergence	Non-convective precipitation
J	Significant Wave Height	Period of Spectral Peak of the Ocean Waves	Precipitation Rate
K	Primary Wave Period	Direction of Spectral Peak of the Ocean Waves	
L	Primary Wave Direction	Height of Significant Wind Waves	
M	Secondary Wave Period	Mean Period of Wind Waves	
N	Secondary Wave Direction	Mean direction of Wind Waves	
O	Vertical Velocity	Height of Significant Swell Waves	
P	Pressure	Mean Direction of Swell Waves	
Q		Wind Speed at 10 m above msl	Stability Index (Best 4-layer index)
R	Relative Humidity	Wind Direction at 10 m above msl	
S	Snow	Salinity	Snow parameters
T	Air Temperature	Ocean Temperature	
U	u Wind Component	U Current Component	
V	v Wind Component	V Current Component	
W		Ocean Temperature Warming	Cape
X	Surface Lifted index	Mixed Data	
Y		Mean Period of Swell Waves	Cin
Z		Refer to GRIB PDS	Helicity

* Surface wind direction, surface wind speed, surface dew-point temperature, maximum surface temperature, and minimum surface temperature

TABLE A.2 GRID DESIGNATOR - A_1 (Header Octet 3)

DESIGNATOR		GRID Number (See Table B)	
	FOS and International (H)	AWIPS (O)	AWIPS (Y or Z)
A	21	228 - 2.5x2.5 deg lon/lat global grid	201 - Northern Hemisphere
B	22	218 - 10-km CONUS	218 - 10-km CONUS
C	23	219 - N. Hemisphere High Resolution	219 - N. Hemisphere High Resolution
D	24	220 - S. Hemisphere High Resolution	220 - S. Hemisphere High Resolution
E	25	221 - N. America High Resolution	221 - N. America High Resolution
F	26	229 - 1.0x1.0 deg lon/lat global grid	222 - N. America Low Resolution
G	50	230 - 0.5x0.5 deg lon/lat global grid	223 - N. Hemisphere Double Resolution
H		231 - 0.5x0.5 deg lon/lat N.H. grid	213 - National CONUS with Double Resolution
I	37	232 - 1.0x1.0 deg lon/lat N.H. grid	202 - National CONUS
J	38	233 - 1.25x1.00 deg lon/lat global grid	203 - National Alaska
K	39	234 - 0.25x0.25 deg lon/lat ECGM regional grid	204 - National Hawaii
L	40	235 - 0.50x0.50 deg lon/lat global grid	205 - National Puerto Rico
M	41		206 - Regional MARD
N	42		207 - Regional Alaska
O	43		208 - Regional Hawaii
P	44		210 - Regional Puerto Rico
Q			211 - Regional CONUS
R		212 - Regional CONUS with Double Resolution	212 - Regional CONUS with Double Resolution
S			209 - Regional MARD with Double Resolution
T	61	214 - Regional Alaska with Double Resolution	214 - Regional Alaska with Double Resolution
U	62	215 - Regional CONUS	215 - Regional CONUS
V	63	216 - Regional Alaska	216 - Regional Alaska
W	64		217 - Local Alaska
X	(Used for experimental transmissions)		

Y			
Z	Refer to GRIB PDS	Refer to GRIB PDS	

TABLE A.3 FORECAST HOUR DESIGNATOR - A_2
(Header Octet 4)

DESIGNATOR	HOUR					
	FOS & International (H) and AWIPS (Y)		National, International (O) and AWIPS (O)		AWIPS (Z)	
A	00	hour analysis	00	hour analysis	02	hour fcst
B	06	hour fcst	03	hour fcst	03	"
C	12	"	06	"	04	"
D	18	"	09	"	08	"
E	24	"	12	"	09	"
F	30	"	15	"	10	"
G	36	"	18	"	14	"
H	42	"	21	"	15	"
I	48	"	24	"	16	"
J	60	"	30	"	20	"
K	72	"	36	"	21	"
L	84	"	42	"	27	"
M	96	"	48	"	54	"
N	108	"	60	"	66	"
O	120	"	72	"	33	"
P	132	"	84	"	39	"
Q	144	"	96	"	45	"
R	156	"	120	"		
S	168	"	144	"		
T	180	"	168	"		
U	192	"	192	"		
V	204	"	216	"		
W	216	"	240	"		
X	228	"	264	"		
Y	240	"	288	"		
Z	Reserved for special purposes		Refer to GRIB PDS		Refer to GRIB PDS	

TABLE A.4 LEVEL DESIGNATORS - ii
(Header Octets 5 and 6)
(H, O, Y, or Z)

The following version of Table A.4 contains changes implemented by the WMO on November 3, 1993. All NCEP products using these level designators that were created after that date adhere to this table. However, some products that existed before November 3, 1993, have yet to be converted and therefore use the version on Page A.6. You will be notified in advance when any such product is going to be converted to use level designators from this version of table A.4.

DESIGNATOR	LEVEL or LAYER
00	Entire Atmosphere
99	1000 hPa
98	Air Properties at Surface of Earth
97	Level of the tropopause
96	Level of the maximum wind
94	Level of 0 deg. C isotherm
93	975 hPa
92	925 hPa
91	875 hPa
89	Any parameter reduced to Sea Level
88	Land/Water Properties at Surface of Earth/Ocean
87	1000-500 mb thickness
86	Boundary Layer
82	825 hPa
77	775 hPa
74	Cloud top level
72	725 hPa
67	675 hPa
62	625 hPa
57	575 hPa
52	525 hPa
47	475 hPa
42	425 hPa
37	375 hPa
32	325 hPa
27	275 hPa
22	225 hPa
17	175 hPa
12	125 hPa
01	Refer to GRIB PDS

Note: The following levels are used to indicate geometric height for aviation flight levels, not pressure levels

81	6000 ft FL (approximately 810 hPa)
73	9000 ft FL (approximately 730 hPa)
64	12000 ft FL (approximately 640 hPa)
51	18000 ft FL (approximately 510 hPa)

Otherwise, the designator given is the hundreds and tens digits of the hPa level in the atmosphere, e.g. 70=700hPa; 03=30hPa, etc.

TABLE A.5 MODEL IDENTIFIERS
(Header Octet 11)

DESIGNATOR	NCEP MODEL
A-B	(Reserved for future use)
C	Aviation Forecast Model
D	Early Eta Model
E	Mesoscale Eta Model
F	Nested Grid Model
G	Rapid Update Cycle
H	Medium Range Forecast Model
I	Sea Surface Temperature Analysis
J	Wind/Wave Forecast Model
K	Global Ensemble Forecasts
L	Regional Ensemble Forecasts
M	Ocean analysis models
N	Ocean forecast models
O-Y	(Reserved for future use)
Z	Refer to GRIB PDS